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Airport Ramp Safety and Crew Performance Issues

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Airport Ramp Safety and Crew Performance Issues

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ABSTRACT

This study examined 182 ramp operations incident reports from the Aviation Safety Reporting System (ASRS) database, to determine which factors influence ramp operation incidents. It was found that incidents occurred more often during aircraft arrival operations than during departure operations; incidents occurred most often at the gate stop area, less so at the gate entry/exit areas, and least on the ramp fringe areas; and reporters cited fewer incidents when more ground crew were present. The authors offer suggestions for both airline management and flight crews to reduce the rate of ramp incidents.

BACKGROUND AND MOTIVATION

Airport ramp safety has been given much attention recently in reports and papers by organizations including the Flight Safety Foundation, International Society of Air Safety Investigators (ISASI), the United Kingdom Flight Safety Committee (UKFSC) and the Airports Association Council International (AACI). In spite of the efforts put forth by safety organizations and air carrier safety departments, damage to aircraft and ground equipment, and injury to ground personnel continue to occur during ramp operations. In addition to the human hazard posed by these incidents, they also incur a substantial operating cost. A speaker at a recent UKFSC seminar states the equipment damage and loss worldwide as the dollar equivalent of fifteen Boeing 747-400s.[2]

During the period 1986-1994, the Aviation Safety Reporting System (ASRS) received almost 1,000 reports describing ramp operations incidents and the human factors that contributed to these events. A detailed examination of ASRS database reports was undertaken to further identify the major types of damage and areas of risk in ramp operations, and the flight crew and ground crew performance errors that contributed to these events.

OBJECTIVES AND SCOPE

Objectives

Specific research objectives were as follows:

- Identify the area of operations in which damage is most likely to occur: ramp entry or exit area, gate entry or exit area, or gate stop area.
- Determine the kinds of damages that occur and their causes.
- Assess the role of environmental factors such as lighting, ramp markings, and surface conditions.
- Assess the role of ground equipment positioning and operations problems in ramp incidents.
- Identify the flight crew and ground crew performance errors that contribute to ramp incidents.
- Recommend enhancements to current ramp procedures to reduce the number of ramp incidents.

Scope

Initial data retrieval included 373 reports from all types of aviation operations. Specific screening criteria were used to review each report for its relevance to the study objectives. To be included in the final study set, an incident had to meet each of the following criteria: 1) involve a ramp operation of an FAR 121 or 135 aircraft or a 2-crew corporate aircraft; 2) reference damage to aircraft or ground equipment, or injury to flight or ground personnel or passengers; and 3) directly involve the flight crew (that is, the flight crew occupied the cockpit at the time of the incident, and their actions or inactions may have contributed to the incident). The research team applied the screening criteria listed above to the initial report set, and selected 182 reports as a final study set. Other types of ramp safety incidents were considered beyond the scope of this study.

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[2] This damage estimate was cited in the closing remarks by Harry Hopkins, the former chairman of the United Kingdom Flight Safety Committee (UKFSC), at the committee's annual seminar held in November, 1994. The focus of the 1994 seminar was "Ramp Accidents: The Problem, the Key, and the Cure."

"Taxiing to the right of the taxi line...marshaler was on FO's side... lighting was poor...a truck was adjacent to another truck...I felt I had at least 3 feet of wing tip clearance...[then] I could see the wing tip coming off the back of the truck...the marshaler was still giving me straight ahead..." (ASRS Report No. 258353)

Improper positioning of ground equipment. Reporters stated that ground equipment was sometimes parked outside its marked areas and encroached on aircraft movement areas. Some reporters also noted that aircraft support vehicles approached the aircraft before it had stopped and the crew had given a signal (usually by turning off the aircraft's rotating beacon).

Improper taxi or parking instructions. Although not specifically related to ground crew performance, taxi lines, stop lines, and lead-in lights were also cited as contributing factors to incidents. Some reporters specifically recommended making the wingwalker position mandatory for all ramp operations, to supplement the mechanical systems.

In 24% of the reports, parking guidance was cited as an issue related to ramp congestion. The combination of ramp congestion and lack of staffing were the precursors to this Captain's experience of hitting a cargo loader:

"...returned to the gate...single marshaler...we had just passed through some congested areas on the other side of the airport and figured we had had practice at judging how close things were to the wing tip...misplaced confidence..." (ASRS Report No. 201610)

Flight Crew Performance Issues. Many flight crew members referenced difficulty in seeing poorly-maintained paint lines and poorly-placed light systems used for self-parking as contributing to incidents. Others reports referenced the crew's inability to accurately judge whether ground equipment was parked outside the aircraft movement area. Other incident precursors mentioned by flight crews included:

- Distraction by cockpit duties, ATC or company communications, checklists, or fatigue;
- Failure to use adequate cockpit coordination skills;
- Inappropriate response to schedule pressure or demand for on-time performance;
- Continuation of an operation even when something didn't look right, or was blatantly wrong;
- Failure to request a tug to get into or out of a tight parking place.

Communications Issues. Reporters were receiving some sort of ramp guidance—verbal, visual, or both—in 79% of the incidents. Reporters stated that they were using visual communication (hand signals, taxi lines, or guide light systems) in 61% of the reported incidents, and verbal communication (with ATC, company ramp control, or ramp personnel) in 24% of the incidents. The low incidence of verbal communications might be notable, except that in 36% of the reports, reporters indicated that verbal communication was *not required* in the operation. Overall, however, 52% of the reporters stated that the communication—either verbal or visual—with the guidance personnel was poor.

Procedural Issues. Air carrier operational procedures were reported as contributory in 34% of the incidents. Some reports cited instances of a crew's failure to follow such established policies or procedures as use of checklists, use of salutes, a verbal statement of "clear right," and other basic operational procedures. Other reports referenced a *lack* of established procedure. Reporters offered suggestions for filling the gap–for example, that simulator training of ramp operations and pushback procedures be instituted for pilots, and that both flight crews and ground crews be exposed to parallel training (that is, each group receiving the same information and training that is provided for the other). Parallel training would promote a clearer understanding of each other's responsibilities and expectations during ramp and gate operations. In the following report, a towing procedure, new to the flight crew, paved the way for a ramp incident:

"Tow crew did not follow their checklist (unknown to us that they even had one for that situation), and did not challenge us to switch off hydraulic pressure to nosewheel. We overlooked it (new situation, no checklist or SOP for it). Result was broken tow bar connection to nosewheel." (ASRS Report No. 264610)

RECOMMENDATIONS FOR REDUCING RAMP OPERATION INCIDENTS

There are a number of actions that air carrier management can take to reduce ramp incidents. The following recommendations are based on the findings presented above and on suggestions from a panel of highly-experienced ASRS analysts:

- Provide additional scenario-based training for ground crews, using some of the incident reports available from the ASRS database;